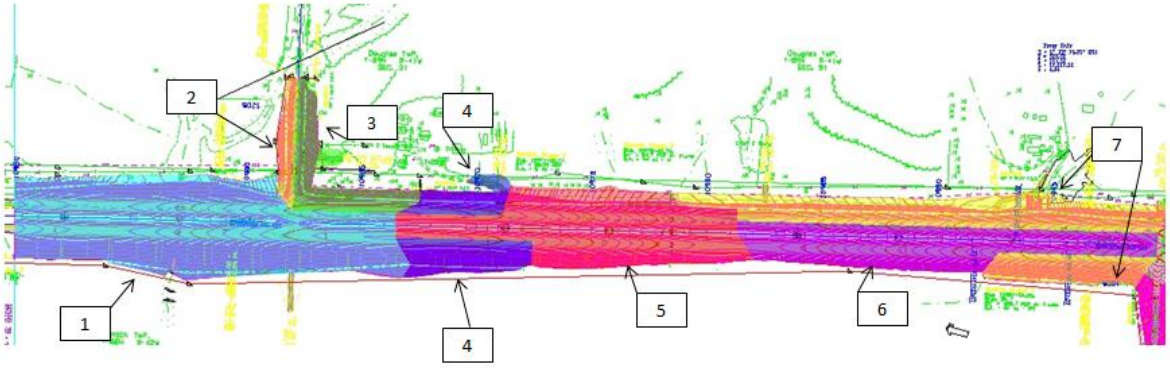
Example – Tabulating Storm Water Storage

The following example demonstrates the process for filling out the storm water tabs. The example is a grading project.

The tabs are presented the order they are typically filled out. For storm water detention devices, start with silt fence ditch checks to see if they will hold the required storage. Other devices such as rock check dams, silt basins, or temporary sediment control basins can be added if silt fence ditch checks are not sufficient to contain the required storage.

Filling in Tab 100-34, Stormwater Drainage Basin

First determine the acres of disturbed area for each drainage basin. A drainage basin is defined as an area of land where surface water converges to a single point at a lower elevation and exits the right-of-way. A disturbed area is where vegetation, rocks, pavement and other protective ground covers are removed resulting in the exposure of underlying soil. Flood the disturbed area to determine the acreage. This project involves seven drainage basins. Each of the drainage basins consists entirely of disturbed area.



1	
2	
3	
4	
5	
6	
7	

Now Tab 100-34 can be properly filled out in the “Disturbed Acres” column. The required storage volume will self-calculate the cubic feet of storage required for that drainage basin. Label each drainage basin and the disturbed area in acres. Stationing for basins starting and ending points, as well as discharge points, will need to be labeled. The figure below shows Tab 100-34 filled out for the project.

			Totals:	41.9			150876.0	

STORMWATER DRAINAGE BASIN — Designer Info

This Data Entry Sheet fills Tab 100-34 effective 04-19-16

Basin No.	Station to Station		Side	Disturbed Area Acres	Discharge Point Station	Discharge Point Side	Required Storage Volume CF	Remarks
1	10950+00.00	10966+50.00	Both	13.71	10956+90.01	Right	49356.0	
2	10961+23.22	10962+13.13	Left	0.81	10961+91.21	Left	2916.0	
3	10962+13.13	10967+62.55	Left	2.34	10962+38.43	Left	8424.0	
4	10966+50.00	10972+47.88	Both	3.00	10972+00.00	Right	10800.0	
5	10966+50.00	10982+10.00	Both	8.16	10975+50.00	Right	29376.0	
6	10981+31.82	10999+55.20	Right	6.25	10988+65.00	Right	22500.0	
7	10978+50.00	11000+35.00	Both	7.64	10992+22.10	Right	27504.0	

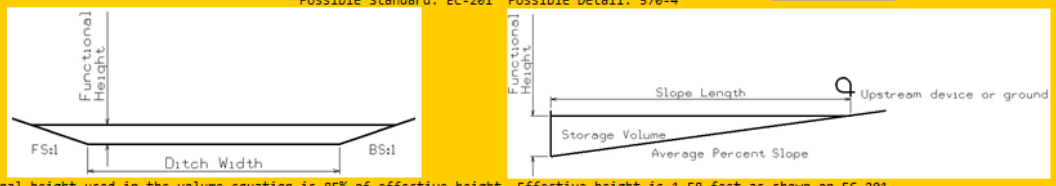
Filling in Tab 100-18, Silt Fences for Ditch Checks

Once Tab 100-34 has been filled out, calculations for storm water devices can begin. For silt fence ditch checks, the foreslope, backslope, ditch width, and average percent slope between devices need to be filled in for the volume to self-calculate. The Spacing column will auto fill when the Avg. % slope field is filled. The drainage basin number is required to be filled in for the volume calculation to work. The figure below shows Tab 100-34 filled out for Basin No. 1.

			Totals:	2647.0	312.0	1360.0							120509.9			

SILT FENCES FOR DITCH CHECKS — Designer Info

Possible Standard: EC-201 Possible Detail: 570-4



* The functional height used in the volume equation is 85% of effective height. Effective height is 1.58 feet as shown on EC-201.
* Volume equation: [0.5*Spacing*(0.5*H²*FS+DW*H+0.5*H²*BS)]

This Data Entry Sheet fills Tab 100-18 effective 10-18-16

Basin No.	Type	Location Station	Location Side	Bid Items Installation LF	Bid Items Maintenance LF	Bid Items Removal LF	Stormwater Storage Volume Summary Foreslope FS:1	Backslope BS:1	Ditch Width FT	Avg. % Slope	Spacing	Down Stream	Volume* CF	Subtotal	Remarks
1	1	10950+50.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	3.4%	45.0	19.3	434.1		
1	1	10950+95.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	3.4%	45.0	19.3	434.1		
1	1	10951+40.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	3.4%	45.0	19.3	434.1		
1	1	10951+85.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	3.4%	45.0	19.3	434.1		
1	1	10952+30.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	3.4%	45.0	19.3	434.1		
1	1	10952+75.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	1.3%	100.0	19.3	964.6		
1	1	10953+75.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	1.3%	100.0	19.3	964.6		
1	1	10954+75.00	Left	25.0	3.0	13.0	3.5	3.0	10.0	1.5%	100.0	19.3	964.6		
1	1	10951+25.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	2.0%	75.0	24.3	909.4		
1	1	10952+00.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	2.0%	75.0	24.3	909.4		
1	1	10952+75.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10953+75.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10954+75.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10955+75.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10956+75.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10954+00.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10954+60.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10955+20.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10955+80.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10956+40.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10957+00.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10957+60.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10958+20.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	1.2%	100.0	21.5	1077.3		
1	1	10959+20.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10959+80.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10963+00.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10964+00.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10965+00.00	Median	46.0	5.0	23.0	6.0	6.0	10.0	1.4%	100.0	24.3	1212.6		
1	1	10961+50.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10962+10.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10962+70.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10963+30.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10963+90.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10964+50.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
1	1	10965+10.00	Right	25.0	3.0	13.0	6.0	3.0	10.0	2.5%	60.0	21.5	646.4		
														28003.37	

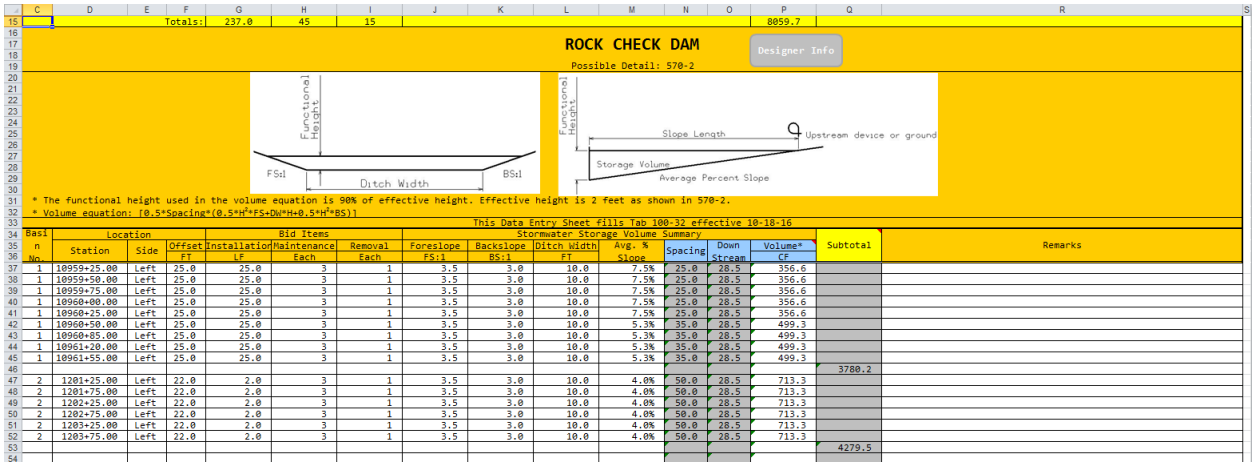
Filling in Tab 100-32, Rock Check Dam

The primary function of rock check dams is to replace silt fence ditch checks that have failed. For that situation, rock check dam quantities are based on a percentage of silt fence ditch check, see Section 10C-1.

> Do not calculate storm water storage volumes for rock check dam quantities calculated as a percent of silt fence ditch checks. Simply tabulate the linear feet, maintenance, and removal quantities.

Include rock check dams for storm water storage only if requested by the Roadside Development Section. Filling out storm water storage volumes in Tab 100-32 for rock check dams is similar to filling out Tab 100-18 for silt fence ditch checks. The foreslope, backslope, ditch width, and average percent slope between devices need to be filled in for the volume to self-calculate. The Spacing column will auto fill when the Avg. % slope field is filled. The drainage basin number is required to be filled in for the volume calculation to work.

For this project, Roadside Development requested the use of rock check dams in drainage basins 1 and 2. The figure below shows Tab 100-32 filled out for Basin No. 1 and 2.



ROCK CHECK DAM

Designer Info

Possible Detail: 570-2

* The functional height used in the volume equation is 90% of effective height. Effective height is 2 feet as shown in 570-2.

* Volume equation: [0.5*Spacing*(0.5*H²*FS+DW*H+0.5*H²*BS)]

This Data Entry Sheet fills Tab 100-32 effective 10-18-16

		Location			Bid Items			Stormwater Storage Volume Summary								
	Basin No.	Station	Side	Offset FT	Installation LF	Maintenance Each	Removal Each	Foreslope FS:1	Backslope BS:1	Ditch Width FT	Avg. % Slope	Spacing	Down Stream	Volume* CF	Subtotal	Remarks
		Totals:			237.0	45	15							8059.7		
	1	10959+25.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	7.5%	25.0	28.5	356.6		
	1	10959+50.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	7.5%	25.0	28.5	356.6		
	1	10959+75.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	7.5%	25.0	28.5	356.6		
	1	10960+00.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	7.5%	25.0	28.5	356.6		
	1	10960+25.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	7.5%	25.0	28.5	356.6		
	1	10960+50.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	5.3%	35.0	28.5	499.3		
	1	10960+85.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	5.3%	35.0	28.5	499.3		
	1	10961+20.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	5.3%	35.0	28.5	499.3		
	1	10961+55.00	Left	25.0	25.0	3	1	3.5	3.0	10.0	5.3%	35.0	28.5	499.3		
															3780.2	
	2	1201+25.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
	2	1201+75.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
	2	1202+25.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
	2	1202+75.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
	2	1203+25.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
	2	1203+75.00	Left	22.0	2.0	3	1	3.5	3.0	10.0	4.0%	50.0	28.5	713.3		
															4279.5	

Filling in Tab 100-14, Silt Basins

If silt fence ditch checks do not provide the required storage volume, silt basins can be used to supplement silt fence ditch checks. The Silt Basins tab self-calculates storage volume based on the inputted width, length, and height.

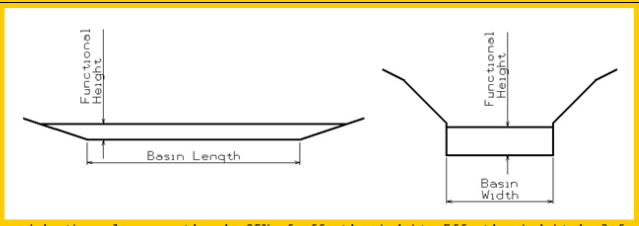
> **Note:** The silt basin tab can have zero cubic feet of storage if the average percent slope is high enough.

For this project, two silt basins are included in drainage basin 1. The figure below shows Tab 100-14 filled in for Basin No. 1.

Totals: 2525.0

SILT BASINS

Possible Standard: EW-403



Designer Info

* The functional height used in the volume equation is 95% of effective height. Effective height is 3 feet as shown in EW-403.
* Volume equation: (0.5*Length*(Width*Height+Width*(Height-Length*Avg%Slope))

This Data Entry Sheet fills Tab 100-14 effective 10-18-16

Basin No.	Location		Bid Items		Stormwater Storage Volume Summary					Subtotal	Remarks
	Station	Side	Installation EACH	Removal EACH	Basin Width FT	Basin Length FT	Height FT	Avg. % Slope	Volume* CF		
1	10995+00.00	Left	1	1	10.0	50.0	2.85	1.3%	1262.5		
1	10960+00.00	Left	1	1	10.0	50.0	2.85	1.3%	1262.5		
										2525.0	

Filling in Tab 100-33, Temporary Sediment Control Basin

The last storm water storage device to consider for use is the Temporary Sediment Control Basin. These are required for drainage basins consisting of 10 acres or more of disturbed area. They can also be used to supplement silt fence ditch checks if they do not provide adequate storage volume.

> **Note:** The temporary sediment control tab can have zero cubic feet of storage if the average percent slope is high enough.

For filling out the maintenance column, typically 3 cleanouts for each device is used. The maintenance number accounts for the number of times a clean out will be necessary.

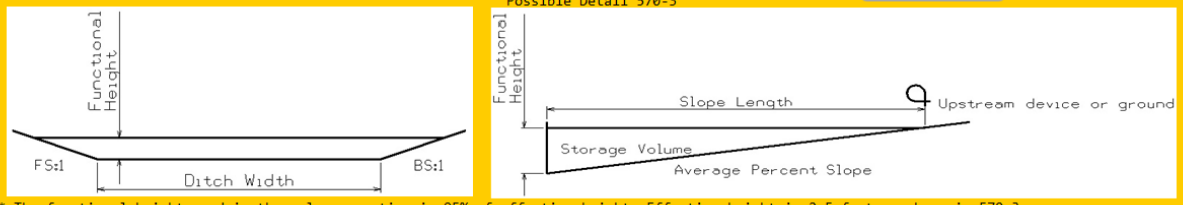
Since drainage basin 1 consists of over 10 acres of disturbed area, at least one temporary sediment control basin is required. The figure below shows Tab 100-33 filled in for Basin No.1, 4, and 5.

Totals: 11 33 11 26347.9

TEMPORARY SEDIMENT CONTROL BASIN

Designer Info

Possible Detail 570-3



* The functional height used in the volume equation is 95% of effective height. Effective height is 2.5 feet as shown in 570-3.
* Volume equation: [(1/4*(FS*H^2))+(1/2*DW*H)+(1/4*(BS*H^2))]*(H/Avg%Slope)

This Data Entry Sheet fills Tab 100-33 effective 10-18-16

Basin No.	Location		Bid Items			Stormwater Storage Volume Summary					Subtotal	Remarks
	Station	Side	Installation Each	Maintenance Each	Removal Each	Foreslope FS:1	Backslope BS:1	Ditch Width FT	Average % Slope	Volume* CF		
1	10956+50.00	Left	1	3	1	3.5	3.0	10.00	1.3%	3844.0		
1	10957+75.00	Left	1	3	1	3.5	3.0	10.00	1.5%	3331.5		
1	10956+50.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
1	10957+75.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
1	10963+00.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
1	10964+25.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
1	10965+50.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
											18844.6	
4	10966+75.00	Right	1	3	1	6.0	3.0	10.00	2.5%	2333.8		
											2333.8	
5	10973+25.00	Left	1	3	1	3.5	3.0	10.00	2.9%	1723.2		
5	10975+50.00	Left	1	3	1	3.5	3.0	10.00	2.9%	1723.2		
5	10977+00.00	Left	1	3	1	3.5	3.0	10.00	2.9%	1723.2		
											5169.6	

Filling in Tab 100-35, Summary of Stormwater Storage

Once all of the storm water device tabs are filled out, the summary of storm water storage tab can be filled out. Each drainage basin needs to have the storm water storage volume from each type of

storm water storage device manually entered in. Storm water storage volume information from tab 100-34 will also need to be entered manually. The figure below shows Tab 100-35 filled in for the project.

	C	D	E	F	G
15			221629.5	150696.0	
16					
17		**SUMMARY OF STORMWATER STORAGE**			
18					
19		Refer to EC Standards and 570s Details.			
20		This Data Entry Sheet fills Tab 100-35 effective 04-19-16			
21					
22	Basin No.	Item	Total Storage Volume Provided	Total Storage Volume Required	Remarks
23					
24			CF	CF	
25	1	Silt Fence Ditch Checks	28003.4		
26		Temporary Sidiment Control Basin	18844.6		
27		Rock Check Dam	3780.2		
28		Silt Basins	2525.0		
29					
30		Totals:	53153.2	49356.0	
31					
32	2	Rock Check Dam	4279.5		
33					
34		Totals:	4279.5	2916.0	
35					
36	3	Silt Fence Ditch Checks	8970.7		
37					
38		Totals:	8970.7	8424.0	
39					
40	4	Silt Fence Ditch Checks	10316.0		
41		Temporary Sediment Control Basin	2333.8		
42					
43		Totals:	12649.8	10800.0	
44					
45	5	Silt Fence Ditch Checks	24405.1		
46		Temporary Sediment Control Basin	5169.6		
47					
48		Totals:	29574.7	29376.0	
49					
50	6	Silt Fence Ditch Checks	22336.6		
51					
52		Totals:	22336.6	22320.0	
53					
54	7	Silt Fence Ditch Checks	27539.1		
55					
56		Totals:	27539.1	27504.0	
57					